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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/809,575	03/15/2001	Borislav Bogdanovic	Studien 280-KGB	5896

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EXAMINER

VOLLANO, JEAN F

ART UNIT	PAPER NUMBER
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1621

DATE MAILED: 11/15/2001

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/809,575

Applicant(s)

BOGDANOVIC ET AL.

Examiner

Jean F. Vollano

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other:

Art Unit: 1621

DETAILED ACTION

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Claim 5 recites the limitation of "Fe, Mn, Co or Cu". The examiner finds only Fe, and Co in the specification. However the original claims are part of the specification and as such the material in the claims can be placed in the body of specification without a new matter problem. The Mn and Cu should be added to the specification as stated in claim 5.

Claim Rejections - 35 USC § 112

2. Claims 1-4, 15 and 19-24 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for some catalysts and co catalysts, does not reasonably provide enablement for every catalyst and co catalysts that make up groups 1-11 and 13-17 on the periodic chart. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims.

The novelty seems to be directed to the catalyst and co catalyst being used in the process since the reaction of an organic halide and magnesium metal to form a Grignard compound is well known in the art.

Art Unit: 1621

It is also well known in the art that catalysts and co catalysts are extremely unpredictable and one catalyst being formed and used does not even predict the same ligand with a different metal center.

The catalyst being used is limited to a transition metal of the periodic table from groups 3, 4, 5, 6, 7, 8, 9, 10 or 11. However those groups include every transition metal on the periodic chart and the ligands or other elements in the catalyst composition or structure come from groups 14-17. Groups 14-17 on the periodic chart include oxygen (which reads on any metal oxide catalyst known), carbon (which reads on organometallic compounds including titanocene and ferrocene), phosphorus (which reads on all transition metal phosphines and phosphonates-already well known as hydrogenation and asymmetric synthesis catalysts), sulfur (which reads on transition metal sulfides and mixed oxides/sulfides), nitrogen (which reads on ammonia and amine transition metal catalysts as well as N-oxide catalysts and phthalocyanine and porphyrin type catalysts), main group metals (e.g. tin, lead which reads on metal-metal interaction catalysts), halogens (which include chloride of transition metals) and silicon which reads on silanes and natural silicates including clays which contain transition metals and zeolites which contain transition metals). The combination of the all the transition metals and Groups 14-16 would easily read on hundreds of thousands of catalysts and almost all known transition metal catalysts.

The cocatalyst is made up of elements found in Groups 1, 2 and 3 which include alkali metals, alkaline earth metals and boron, aluminum and gallium. These metals have a requirement of containing one or more elements of groups 14-17 or hydrogen seemingly as a

Art Unit: 1621

hydride. This group includes alumina which is a common support for many catalysts and would be a cocatalyst as given in the instant claims. The cocatalyst also reads on sodium hydroxide (Group 1 and Group 16 elements) and Lithium aluminum hydride (Group 1, Group 3 and hydrogen). It is noted that hydrides need different non reactive solvents (i.e. no water) than sodium hydroxide (water is okay) so as to not react with the solvent. Again, the cocatalyst is so broad as to read on thousands of compounds which have different chemical characteristics and whose combination with the hundreds of thousands transition metal catalysts would require lengthy experimentation to find the right quantities and conditions to activate the system for catalytic purposes to be used in the instant invention.

US 6,096,936 teaches a L-type zeolite catalyst which is prepared by supporting a platinum which can have various ligands including tetraammineplatinum chloride or tetraammineplatinum hydroxide (transition metal which contains a group 15 element) which is placed on an L type zeolite represented by the formula $(0.9-1.3 M_{2/n}O \cdot Al_2O_3 \cdot 5.0-7SiO_2 \cdot 0-9H_2O)$ wherein M is an alkali metal (Na, Li, K etc) or an alkaline earth metal (Ca, Mg, Be etc). This catalyst/cocatalyst is used for the production of aromatic hydrocarbons. This combination reads on the catalyst and co catalyst given in the instant invention (transition metal Pt Group 15 element -ammine -NH₃, Group 1 or 2 (Na, Li, K, Ca, Mg) or Group 13 (Al) elements with group 14, 15, 16 or 17 (oxygen as oxides). However there is no mention in the specification nor could the examiner find in a literature search the use of this catalyst/cocatalyst combination to prepare Grignard compounds. Without guidance it would take undue experimentation to make the

Art Unit: 1621

catalyst and use it for the instant invention process since it is well known that catalysts are unpredictable and therefore the quantity, the temperature, the solvent, the catalyst particle size etc would have to be determined for the catalyst/cocatalyst utility in the instant invention.

US 5,550,093 teaches gold/iron oxide catalyst on silica alumina which meets the requirements of a catalyst/cocatalyst for the instant invention (see example 2). However this catalyst is used for carbon monoxide oxidation. There is no teaching in the instant invention or the literature of what parameters would be necessary to form and use the catalyst in the instant process.

US 5,650,528 teaches metallocene catalysts (transition metal and carbon -Group 14 element) which can be used in combination with a suitable cocatalyst to produce catalyst systems for polymerization of olefins. The cocatalysts include metals of Group IA, IIA and IIIB (e.g. Na, Li, K, Ca, Mg, Al, B) including hydrides and including trialkyl aluminum as preferred (Group 13 -aluminum and Group 14-carbon). The catalyst system is used for epoxidation , asymmetric hydrogenation , ketone reduction, alkene isomerization, but there is no mention of Grignard formation and no guidance in the specification of how to use this combination as a catalyst system in the instant invention. Again, since catalysts are unpredictable it would take undue experimentation to make and use the catalyst system in the instant process.

These are just a few of the thousand of patents which have catalytic systems which fall into the scope of what is being claimed in the instant invention.

Art Unit: 1621

The specification describes and exemplifies ferrous chloride, and cobalt phthalocyanine as transition metals and claim 5 claims Mn and Cu. The cocatalysts that are taught in the specification are found in instant claim 9 and magnesium chloride is exemplified in the specification. Although not claimed in instant claim 1, cocatalysts in the specification include ammonium halides and organoammonium halides.

The scope of the claims is broader than the scope of the enablement and it would take undue experimentation (with the unpredictability of catalyst systems) to make and use the claimed invention.

3. Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation of a “transition metal and an additional catalyst component”. However the additional component seems to be stand alone compound (e.g. lithium hydride or magnesium chloride) and it is unclear if the catalyst component is referring to a co catalyst or a part of the one and only catalyst. The claim is confusing as to the metes and bounds of what applicant considers as the instant invention.

Claim 15 recites the limitation of “one or more cocatalysts are additionally employed”. This limitation is confusing as to whether the limitation is drawn to the additional catalyst components found in claim 1 or if this limitation is to an additional cocatalyst outside the limitation of claim 1. The 16 recites that the cocatalyst includes magnesium anthracene which is

Art Unit: 1621

included in the limitation of the additional catalyst component. The claim is confusing as written as to the metes and bounds of what is being claimed. The examples seem to have a catalyst and a second (cocatalyst?) component and not any more components. However instant claim 1 does not call the additional catalyst component of claim 1 a cocatalyst. The claims are confusing as to the metes and bounds of what is being claimed. The same problem exists in claims 17-18.

Claim 16 recites the limitation "an ammonium halide and/or an organoammonium halide" . There is insufficient antecedent basis for this limitation in the claim.

Double Patenting

4. Claims 1, 3-5, 8-9, 16 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-2 and 6 of U.S. Patent No. 6,117,372. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant invention is claiming a process for preparing Grignard compounds reacting an organic halide and magnesium metal with a transition metal catalyst and a cocatalyst that comprises an element from Groups 1, 2, or 3 and an element from Groups 14-17 which has an ethereal solvent (selected from tetrahydrofuran, monoglyme or diglyme) whereas US 6,117,372 claims a process for preparing Grignard compounds comprising reacting an organic halide with magnesium metal in the presence of a transition metal catalyst that comprises a transition metal and a halide (which also comprises magnesium and is within the term comprises) and a

Art Unit: 1621

cocatalyst of an aromatic magnesium compound which is within the cocatalyst structures being claimed (i.e. Group 2 with Group 14) which has an ethereal solvent (selected from tetrahydrofuran, monoglyme or diglyme). The instant invention has a somewhat broader scope. However the catalyst and co catalyst, the solvent and the formation of the Grignard reagent of US 6,117,372 are being claimed as a subset of the in the instant invention. There is an large overlap in the claims and the instant invention is an obvious variant of the claimed invention of US 6,117,372.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-6, 8-9, 15-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Bogdanovic et al (DE 19628159).

Art Unit: 1621

Bogdanovic discloses the preparation of Grignard reagents including aromatic chloro compound by the reaction of magnesium metal in the presence of transition metal/magnesium chloride complex as a catalyst wherein the initial reaction contains $\text{FeCl}_2/\text{MgCl}_2$. (That combination is claimed in the instant claim 1 and when that combination is put together it will inherently form what it will form) (also MgCl_2 acts as the catalyst component and the co catalyst -if they are different -see the 112, paragraph 2 rejection) (See page 2).

Bogdanovic discloses that the solvent used can be THF, monoglyme or diglyme (see page 4, claim 3).

When Bogdanovic discloses that magnesium powder is used then the claims are fully anticipated (page 1, lines 40-42) .

7. Claims 1, 9-13 and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bogdanovic et al (DE 19628159) in view of Chem abs 246 (CA:76:121246), Chem abs 789 (CA:77:164789) and Chem abs 844 (CA:114:42844).

The rejection over Bogdanovic et al is essentially the same as supra.

Bogdanovic teaches that at time $t+1$ there is the formation of an organomagnesium halide which is formed in situ from an organic halide and excess magnesium (see examples)

Bogdanovic is silent as to any activation of the magnesium and does not have all the molar ratios given.

Art Unit: 1621

Chem abs 246 gives a generic teaching that the magnesium can be activated by the addition of iodine (the activation would make the magnesium more reactive in any use).

Chem abs 789 gives a generic teaching that magnesium in a powder form is more reactive than magnesium turnings in Grignard synthesis.

Chem abs 844 gives a generic teaching that magnesium can be activated mechanically by agitation (i.e. stirring) in an inert atmosphere for use in formation of Grignard compounds.

It would have been obvious to have used the process of Ramsden and to have activated the magnesium to afford a faster and more complete reaction due to the use of the activated magnesium. It is commonly known in the art to activate magnesium to make it more reactive as taught by the Chem abstracts references above. It is also within the purview of one of ordinary skill in the art to optimize the molar ratios of the transition metal catalyst to the reagents (i.e. organic halide) in order to optimize the activity of the catalyst. It is also noted that at time t+1 that the Grignard which is an organomagnesium halide is formed and then the Grignard is used as its own catalyst component.

8. Claims 1-2, 5-6, 15, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramsden (US 2,777,885).

Ramsden teaches the preparation of aryl magnesium halides (i.e. Grignard compounds, e.g. phenyl magnesium chloride) by the reaction of an aryl halide with magnesium in the

Art Unit: 1621

presence of a metal catalyst including transition metals (e.g. Fe, Co , Cu) which are bonded to an element of Group 16 (column 1, lines 36-40).

Ramsden teaches that the catalyst can also be a main group metal complex from groups 1 and 2 including Na or Ca or Ba which are also bonded to an element of Group 16(column 1, lines 36-40).

Ramsden differs in that the catalysts are not combined together. However it would have been obvious to one of ordinary skill in the art to have combined the catalysts since Ramsden teaches that all the catalysts are usable in the Grignard synthesis. The motivation would be to increase the catalytic activity by the addition of two known catalysts with the expectation that they would be at least additive and perhaps synergistic.

9. Claims 1 and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramsden in view of Chem abs 246 (CA:76:121246) and Chem abs 523 (CA:80:133523), Chem abs 789 (CA:77:164789) and Chem abs 844 (CA:114:42844).

The rejection over Ramsden is the same as supra.

Ramsden uses commercial magnesium turnings and is silent as to any other magnesium starting materials.

Chem abs 246 gives a generic teaching that the magnesium can be activated by the addition of iodine (the activation would make the magnesium more reactive in any use).

Art Unit: 1621

Chem abs 523 gives a generic teaching that magnesium can be activated by forming a fine black powder (which would also have more surface area and be activated also by the surface area).

Chem abs 789 gives a generic teaching that magnesium in a powder form is more reactive than magnesium turnings in Grignard synthesis.

Chem abs 844 gives a generic teaching that magnesium can be activated mechanically by agitation (i.e. stirring) in an inert atmosphere for use in formation of Grignard compounds.

It would have been obvious to have used the process of Ramsdent and to have activated the magnesium to afford a faster and more complete reaction due to the use of the activated magnesium. It is commonly known in the art to activate magnesium to make it more reactive as taught by the Chem abstracts references above.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr J F Vollano whose telephone number is (703) 305-4483. The examiner can normally be reached on Monday to Thursday from 6:30 to 5:00 .

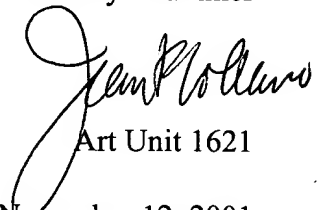
11. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter , can be reached on (703)308-4532 . The official fax phone number for the organization where this application or proceeding is assigned is (703)308-4556. It should be noted that the examiner cannot immediately work on a fax sent to this number.

Art Unit: 1621

12. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-1235.

Jean F. Vollano

Primary Examiner

A handwritten signature in black ink, appearing to read "Jean F. Vollano", written over the printed name and title.

Art Unit 1621

November 12, 2001